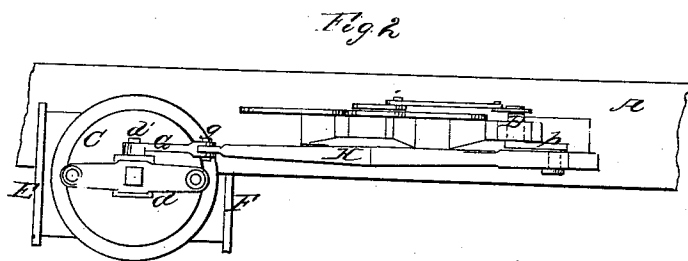
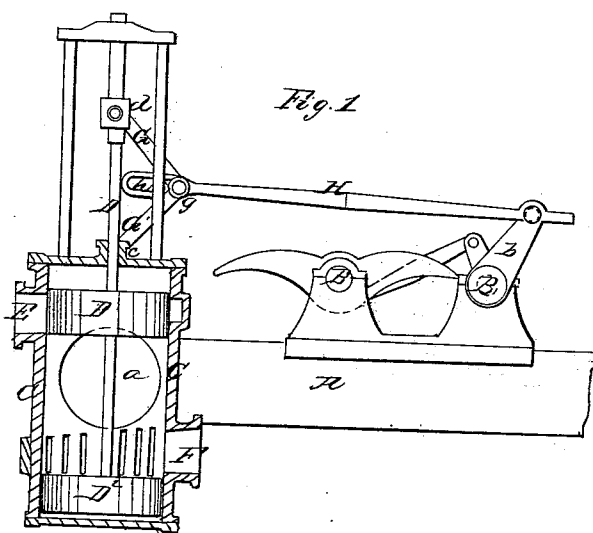


H. Reid,

Exhaust Mechanism for Steam Engines.
N^o 84,761.

Patented Dec. 8, 1868.



Witnesses.

Robert Burns

Wm. W. Hordel,

Inventor.

Hugh Reid by his atty

Reid & Co.

United States Patent Office.

HUGH REID, OF ST. LOUIS, MISSOURI.

Letters Patent No. 84,761, dated December 8, 1868.

IMPROVEMENT IN STEAM-ENGINE VALVE-GEAR.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HUGH REID, of St. Louis, in the county of St. Louis, and State of Missouri, have made certain new and useful Improvements in Valve-Motion for High and Low-Pressure Engines; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of my said invention is to add to the advantages arising from the high steam-pressures in the ordinary high-pressure engine, the advantages arising from the low back-pressure of the so-called low-pressure engine; and I achieve the said object by passing the exhaust steam of the high-pressure engine into any surface or jet-condensation vessel, excepting at short intervals immediately succeeding the completion of each piston-stroke, at which times the exhaust is made directly or indirectly to the air without.

And the special nature of this invention is in certain improvements in operating the valves for the regulation of said steam-exhaust, in which this invention differs from that secured by Letters Patent of date the 13th day of October, A. D. 1868, and numbered 83,095, and issued to me for "improvement in valve-motion for steam-engines."

These improvements relate, principally, to the construction of a double piston-valve, and its operation in a valve-cylinder, avoiding the use of springs, and avoiding the necessity of a separate "atmospheric" valve, for regulating the exhaust of steam to the atmosphere.

To enable those skilled herein to make and use my said invention, I will now more fully describe the same, referring to the accompanying

Figure 1, as a central sectional elevation, and to

Figure 2, as a top plan.

The said drawings show the manner of connecting my said improvement to the ordinary form of high-pressure engine in use upon the steamboats on the Mississippi and other western rivers.

A represents the exhaust-pipe, into which the steam is discharged at the end of every stroke of the piston. The valves operating the exhaust of the steam from said pipe A, are operated by the rock-shafts B, which, themselves, are usually worked by cam-rods from the driving-shaft of the engine. And similarly, as in my invention before referred to, I connect the rods for operating my exhaust-valves with said rock-shafts B, or, as they are usually termed, the "full-stroke" rock-shafts, because these parts are closely allied to and dependent upon each other in their action.

In order to regulate the exhaust of steam from the pipe A, I use the valve-cylinder C, into which (near its centre) the exhaust-pipe A discharges at *a*. In said cylinder I arrange the rod D, having the two pistons, D¹ and D², secured thereon. Said cylinder C has the air-exhaust E and the condenser-exhaust opening F, leading respectively to the air and the condenser. The said pistons D¹ and D² are so placed that the steam

cannot exhaust at both openings, E and F, at one and the same time, but that, one opening being closed, the other will be open.

In order to operate the piston-valves D¹ D², I connect to the cross-head *d* of the rod D the toggle-lever G, by the pin *d*. A similar toggle-lever, G', is pivoted on the head of the cylinder C at *c*, said lever G' connecting with G by the pin *g*. The pin *g* moves in the slot *h* of the valve-rod H, and this operated by the crank-arm *b* of the rock-shaft B, above mentioned.

The rod D may be squared above the cross-head *d*, and be guided in a frame, I, sustained upon the cylinder C, or in any similar manner.

The operation of the parts thus described is as follows:

Immediately upon the completion of the stroke of the main piston, the vacuum-opening F stands closed, and the piston D² covers said opening, whilst the piston D¹, coming above the steam-entrance *a*, permits the discharge of steam to the air-exhaust E, which leads directly or indirectly to the air.

During this exhaust of steam the rock-shaft B is moving the rod H forward, and thus raising the valve-stem D; but, as at the time of closing the valve F, the toggles G G' stand nearly vertical, by the motion of the rod H they reach a vertical position, and thus, as the steam-pressures upon D¹ and D² balance each other, the weight of the valves D¹ and D², and the air-pressure, aid (being opposed solely by the vacuum-pressure) to cause the toggles G G' to fall, and the pin *g* moves almost instantly in the slot *h* of the rod H, thus closing the air-exhaust E by the downward motion of the piston-rod D, and opening the vacuum-exhaust F.

And this exhaust to the condenser now ensues until, by the motion of the rock-shaft B, the toggles G G' have approached very nearly a vertical line, when again, for a very short interval of time, (at the end of the stroke of main piston,) the exhaust E is opened as aforesaid.

It is plain, therefore, that by arrangement of equal-surfaced pistons D¹ and D², and by action of the slot *h*, the quick throw of the valve is effected, this being an essential condition to the proper action of this invention, in accordance with the object thereof.

Having thus fully described my invention,

What I claim, is—

1. The arrangement of the balanced piston-valves D¹ D², with reference to the exhaust-cylinder C, steam-port *a*, and exhaust-ports E and F, substantially as set forth.

2. The arrangement of the piston-valves D¹ D² with reference to the rod *d*, toggles G G', pin *g*, slot *h*, and rod H, substantially as described.

In witness of said invention, I have hereunto set my hand, in the presence of—

HUGH REID.

Witnesses:

DAVID F. OKES,
GEO. P. HERTHEL, Jr.